

SEQUENCE LISTING

<110> Van Mellaert, Herman  
Botterman, Johan  
Van Rie, Jeroen  
Joos, Henk

<120> RECOMBINANT PLANT EXPRESSING NON-COMPETITIVELY BINDING Bt INSECTICIDAL CRYSTAL PROTEINS

<130> 021565-078  
<140> 09/661,061

<141> September 13, 2000

<150> PCT/EP90/00905  
<151> 1990-05-30

<150> GB 89401499.2  
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<170> PatentIn Ver. 2.0

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gcc tcc gtc att aaa ggt cct gga ttt aca ggt gga gat att ctg act	1733
Ala Ser Val Ile Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr	
475 480 485 490	
agg aat agt atg ggc gag ctg ggg acc tta cga gta acc ttc aca gga	1781
Arg Asn Ser Met Gly Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly	
495 500 505	
aga tta cca caa agt tat tat ata cgt ttc cgt tat gct tcg gta gca	1829
Arg Leu Pro Gln Ser Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala	
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cta gtt gcg tgt tta tcg gat gaa ttt tgt ctg gat gaa aag aga gaa Leu Val Ala Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu 635 640 645 650	2213
ttg tcc gag aaa gtt aaa cat gca aag cga ctc agt gat gag cgg aat Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn 655 660 665	2261
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acc cgt tat caa tta aga ggg tat atc gaa gat agt caa gac tta gaa	2501		
Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu			
735	740	745	
atc tat tta att cgt tac aat gca aaa cac gaa ata gta aat gta cca	2549		
Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro			
750	755	760	
ggt aca gga agt tta tgg cct ctt tct gta gaa aat caa att gga cct	2597		
Gly Thr Gly Ser Leu Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro			
765	770	775	
tgt gga gaa ccg aat cga tgc gcg cca cac ctt gaa tgg aat cct gat	2645		
Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp			
780	785	790	
tta cac tgt tcc tgc aga gac ggg gaa aaa tgt gca cat cat tct cat	2693		
Leu His Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser His			
795	800	805	810
cat ttc tct ttg gac att gat gtt gga tgt aca gac tta aat gag gac	2741		
His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp			
815	820	825	
tta ggt gta tgg gtg ata ttc aag att aag acg caa gat ggc cac gca	2789		
Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala			
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cga cta ggg aat cta gag ttt ctc gaa gag aaa cca tta tta gga gaa	2837		
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gca cta gct cgt gtg aaa aga gcg gag aaa aaa tgg aga gac aaa cgc	2885		
Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg			
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gaa aca tta caa ttg gaa aca act atc gtt tat aaa gag gca aaa gaa	2933		
Glu Thr Leu Gln Leu Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu			
875	880	885	890
tct gta gat gct tta ttt gta aac tct caa tat gat aga tta caa gcg	2981		
Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala			
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gat acg aac atc gcg atg att cat gcg gca gat aaa cgc gtt cat aga	3029		
Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Arg			
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925	930	935	

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aat cac cgt tca gtc ctg gtt atc cca gaa tgg gag gca gaa gtg tca Asn His Arg Ser Val Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser 990 995 1000	3269
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gct tac aaa gag gga tat gga gaa ggt tgc gta acg atc cat gag atc Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile 1020 1025 1030	3365
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Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn  
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Phe Val Pro Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp  
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Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu  
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Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile  
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Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala  
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Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu  
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile  
130 135 140

Pro Leu Phe Arg Val Gln Asn Tyr Glu Val Ala Leu Leu Ser Val Tyr  
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Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val  
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr  
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp  
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp  
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu  
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile  
245 250 255

Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro Phe  
260 265 270

Ile Asn Gln Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala  
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn  
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp Gly  
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile  
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr  
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile  
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu  
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile  
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala  
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile  
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Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser  
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Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro  
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Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly  
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Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu  
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Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr  
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Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe  
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Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met  
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Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu  
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Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr  
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Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val  
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Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val  
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Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser  
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Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys  
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His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn  
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Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr  
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Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val  
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Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln  
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Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg  
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Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr  
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Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg  
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Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg  
785 790 795 800

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile  
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Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile  
820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu  
835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys  
850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu  
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe  
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met  
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Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu  
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu  
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Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn  
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Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val  
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Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu  
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Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys  
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Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr Asp Glu  
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Leu Lys Phe Asn Asn Cys Val Glu Glu Val Tyr Pro Asn Asn Thr  
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Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala Tyr Gly Asn Asn Pro  
1075 1080 1085

Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr Glu Glu Lys Ser Tyr Thr  
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Asp Arg Arg Arg Glu Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp  
105 1110 1115 1120

Tyr Thr Pro Leu Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe  
1125 1130 1135

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Met  
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Glu Glu Asn Asn Gln Asn Gln Cys Ile Pro Tyr Asn Cys Leu Ser Asn	
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Pro Glu Glu Val Leu Leu Asp Gly Glu Arg Ile Ser Thr Gly Asn Ser	
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Ser Ile Asp Ile Ser Leu Ser Leu Val Gln Phe Met Val Ser Asn Phe	
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Val Pro Gly Gly Phe Leu Val Gly Leu Ile Asp Phe Val Trp Gly	
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Ile Val Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile Glu Gln	
70 75 80	
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Leu Ile Asn Glu Arg Ile Ala Glu Phe Ala Arg Asn Ala Ala Ile Ala	
85 90 95	
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Asn Leu Glu Gly Leu Glu Asn Asn Leu Asn Ile Tyr Val Glu Ala Phe	
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Lys Glu Trp Glu Asp Pro Asn Asn Pro Glu Thr Arg Thr Arg Val	
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Gln Ala Ala Asn Leu His Leu Ala Ile Leu Arg Asp Ser Val Ile Phe	
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Tyr Asn Arg Gly Leu Asn Asn Leu Pro Lys Ser Thr Tyr Gln Asp Trp	
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Arg Leu Leu Gln Gln Pro Trp Pro Ala Pro Pro Phe Asn Leu Arg Gly	
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Val Glu Gly Val Glu Phe Ser Thr Pro Thr Asn Ser Phe Thr Tyr Arg	
390 395 400	
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Phe Val Gln Arg Ser Gly Thr Pro Phe Leu Thr Thr Gly Val Val Phe		
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Ser Trp Thr His Arg Ser Ala Thr Leu Thr Asn Thr Ile Asp Pro Glu		
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470	475	480
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Thr Ser Val Ile Thr Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg		
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595	600	605
att gaa att att cta gca gat gca aca ttt gaa gca gaa tct gat tta		2108
Ile Glu Ile Ile Leu Ala Asp Ala Thr Phe Glu Ala Glu Ser Asp Leu		
610	615	620
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cgt ggc tgg aga gga agt aca gat att acc atc caa gga gga gat gac Arg Gly Trp Arg Gly Ser Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp 710 715 720	2396
gta ttc aaa gag aat tac gtc aca cta ccg ggt acc gtt gat gag tgc Val Phe Lys Glu Asn Tyr Val Thr Leu Pro Gly Thr Val Asp Glu Cys 725 730 735	2444
tat cca acg tat tta tat cag aaa ata gat gag tcg aaa tta aaa gct Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala 740 745 750	2492
tat acc cgt tat gaa tta aga ggg tat atc gaa gat agt caa gac tta Tyr Thr Arg Tyr Glu Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu 755 760 765	2540
gaa atc tat ttg atc cgt tac aat gca aaa cac gaa ata gta aat gtg Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Ile Val Asn Val 770 775 780 785	2588
cca ggc acg ggt tcc tta tgg ccg ctt tca gcc caa agt cca atc gga Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro Ile Gly 790 795 800	2636
aag tgt gga gaa ccg aat cga tgc gcg cca cac ctt gaa tgg aat cct Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn Pro 805 810 815	2684
gat cta gat tgt tcc tgc aga gac ggg gaa aaa tgt gca cat cat tcc Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser 820 825 830	2732

cat cat ttc acc ttg gat att gat gtt gga tgt aca gac tta aat gag His His Phe Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu 835 840 845	2780
gac tta ggt gta tgg gtg ata ttc aag att aag acg caa gat ggc cat Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His 850 855 860 865	2828
gca aga cta ggg aat cta gag ttt ctc gaa gag aaa cca tta tta ggg Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly 870 875 880	2876
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cga gag aaa ctg cag ttg gaa aca aat att gtt tat aaa gag gca aaa Arg Glu Lys Leu Gln Leu Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys 900 905 910	2972
gaa tct gta gat gct tta ttt gta aac tct caa tat gat aga tta caa Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln 915 920 925	3020
gtg gat acg aac atc gcg atg att cat gcg gca gat aaa cgc gtt cat Val Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His 930 935 940 945	3068
aga atc cgg gaa gcg tat ctg cca gag ttg tct gtg att cca ggt gtc Arg Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val 950 955 960	3116
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tcc tta tat gat gcg aga aat gtc att aaa aat ggc gat ttc aat aat Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn 980 985 990	3212
ggc tta tta tgc tgg aac gtg aaa ggt cat gta gat gta gaa gag caa Gly Leu Leu Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln 995 1000 1005	3260
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aca gca tat aaa gag gga tat gga gag ggc tgc gta acg atc cat gag	3404
Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu	
1045 1050 1055	
atc gaa gac aat aca gac gaa ctg aaa ttc agc aac tgt gta gaa gag	3452
Ile Glu Asp Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu	
1060 1065 1070	
gaa gta tat cca aac aac aca gta acg tgt aat aat tat act ggg act	3500
Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asn Tyr Thr Gly Thr	
1075 1080 1085	
caa gaa gaa tat gag ggt acg tac act tct cgt aat caa gga tat gac	3548
Gln Glu Glu Tyr Glu Gly Thr Tyr Ser Arg Asn Gln Gly Tyr Asp	
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gaa gcc tat ggt aat aac cct tcc gta cca gct gat tac gct tca gtc	3596
Glu Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val	
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tat gaa gaa aaa tcg tat aca gat gga cga aga gag aat cct tgt gaa	3644
Tyr Glu Glu Lys Ser Tyr Thr Asp Gly Arg Arg Glu Asn Pro Cys Glu	
1125 1130 1135	
tct aac aga ggc tat ggg gat tac aca cca cta ccg gct ggt tat gta	3692
Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr Val	
1140 1145 1150	
aca aag gat tta gag tac ttc cca gag acc gat aag gta tgg att gag	3740
Thr Lys Asp Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile Glu	
1155 1160 1165	
atc gga gaa aca gaa aca ttc atc gtg gat agc gtg gaa tta ctc	3788
Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu Leu	
1170 1175 1180 1185	
ctt atg gag gaa taa gatacgttat aaaatgtaac gtatgcaaat aaagaatgat	3843
Leu Met Glu Glu	
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ctcttaagag aatgatgtcc	3923

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Ser Ser Ile Asp Ile Ser Leu Ser Leu Val Gln Phe Met Val Ser Asn  
35 40 45

Phe Val Pro Gly Gly Phe Leu Val Gly Leu Ile Asp Phe Val Trp  
50 55 60

Gly Ile Val Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile Glu  
65 70 75 80

Gln Leu Ile Asn Glu Arg Ile Ala Glu Phe Ala Arg Asn Ala Ala Ile  
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Ala Asn Leu Glu Gly Leu Glu Asn Asn Leu Asn Ile Tyr Val Glu Ala  
100 105 110

Phe Lys Glu Trp Glu Glu Asp Pro Asn Asn Pro Glu Thr Arg Thr Arg  
115 120 125

Val Ile Asp Arg Phe Arg Ile Leu Asp Gly Leu Leu Glu Arg Asp Ile  
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Pro Ser Phe Arg Ile Ser Gly Phe Glu Val Pro Leu Leu Ser Val Tyr  
145 150 155 160

Ala Gln Ala Ala Asn Leu His Leu Ala Ile Leu Arg Asp Ser Val Ile  
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Phe Gly Glu Arg Trp Gly Leu Thr Thr Ile Asn Val Asn Glu Asn Tyr  
180 185 190

Asn Arg Leu Ile Arg His Ile Asp Glu Tyr Ala Asp His Cys Ala Asn  
195 200 205

Thr Tyr Asn Arg Gly Leu Asn Asn Leu Pro Lys Ser Thr Tyr Gln Asp  
210 215 220

Trp Ile Thr Tyr Asn Arg Leu Arg Arg Asp Leu Thr Leu Thr Val Leu  
225 230 235 240

Asp Ile Ala Ala Phe Phe Pro Asn Tyr Asp Asn Arg Arg Tyr Pro Ile  
245 250 255

Gln Pro Val Gly Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Ile  
260 265 270

Asn Phe Asn Pro Gln Leu Gln Ser Val Ala Gln Leu Pro Thr Phe Asn  
275 280 285

Val Met Glu Ser Ser Ala Ile Arg Asn Pro His Leu Phe Asp Ile Leu  
290 295 300

Asn Asn Leu Thr Ile Phe Thr Asp Trp Phe Ser Val Gly Arg Asn Phe  
305 310 315 320

Tyr Trp Gly Gly His Arg Val Ile Ser Ser Leu Ile Gly Gly Gly Asn  
325 330 335

Ile Thr Ser Pro Ile Tyr Gly Arg Glu Ala Asn Gln Glu Pro Pro Arg  
340 345 350

Ser Phe Thr Phe Asn Gly Pro Val Phe Arg Thr Leu Ser Asn Pro Thr  
355 360 365

Leu Arg Leu Leu Gln Gln Pro Trp Pro Ala Pro Pro Phe Asn Leu Arg  
370 375 380

Gly Val Glu Gly Val Glu Phe Ser Thr Pro Thr Asn Ser Phe Thr Tyr  
385 390 395 400

Arg Gly Arg Gly Thr Val Asp Ser Leu Thr Glu Leu Pro Pro Glu Asp  
405 410 415

Asn Ser Val Pro Pro Arg Glu Gly Tyr Ser His Arg Leu Cys His Ala  
420 425 430

Thr Phe Val Gln Arg Ser Gly Thr Pro Phe Leu Thr Thr Gly Val Val  
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Phe Ser Trp Thr His Arg Ser Ala Thr Leu Thr Asn Thr Ile Asp Pro  
450 455 460

Glu Arg Ile Asn Gln Ile Pro Leu Val Lys Gly Phe Arg Val Trp Gly  
465 470 475 480

Gly Thr Ser Val Ile Thr Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu  
485 490 495

Arg Arg Asn Thr Phe Gly Asp Phe Val Ser Leu Gln Val Asn Ile Asn  
500 505 510

Ser Pro Ile Thr Gln Arg Tyr Arg Leu Arg Phe Arg Tyr Ala Ser Ser  
515 520 525

Arg Asp Ala Arg Val Ile Val Leu Thr Gly Ala Ala Ser Thr Gly Val  
530 535 540

Gly Gly Gln Val Ser Val Asn Met Pro Leu Gln Lys Thr Met Glu Ile  
545 550 555 560

Gly Glu Asn Leu Thr Ser Arg Thr Phe Arg Tyr Thr Asp Phe Ser Asn  
565 570 575

Pro Phe Ser Phe Arg Ala Asn Pro Asp Ile Ile Gly Ile Ser Glu Gln  
580 585 590

Pro Leu Phe Gly Ala Gly Ser Ile Ser Ser Gly Glu Leu Tyr Ile Asp  
595 600 605

Lys Ile Glu Ile Ile Leu Ala Asp Ala Thr Phe Glu Ala Glu Ser Asp  
610 615 620

Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Ser Asn  
625 630 635 640

Gln Ile Gly Leu Lys Thr Asp Val Thr Asp Tyr His Ile Asp Gln Val  
645 650 655

Ser Asn Leu Val Asp Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys  
660 665 670

Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp Glu  
675 680 685

Arg Asn Leu Leu Gln Asp Pro Asn Phe Arg Gly Ile Asn Arg Gln Pro  
690 695 700

Asp Arg Gly Trp Arg Gly Ser Thr Asp Ile Thr Ile Gln Gly Gly Asp  
705 710 715 720

Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Pro Gly Thr Val Asp Glu  
725 730 735

Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu Lys  
740 745 750

Ala Tyr Thr Arg Tyr Glu Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp  
755 760 765

Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Ile Val Asn  
770 775 780

Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro Ile  
785 790 795 800

Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn  
805 810 815

Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His  
820 825 830

Ser His His Phe Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn  
835 840 845

Glu Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly  
850 855 860

His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Leu  
865 870 875 880

Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp  
885 890 895

Lys Arg Glu Lys Leu Gln Leu Glu Thr Asn Ile Val Tyr Lys Glu Ala  
900 905 910

Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu  
915 920 925

Gln Val Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val  
930 935 940

His Arg Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly  
945 950 955 960

Val Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala  
965 970 975

Tyr Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn  
980 985 990

Asn Gly Leu Leu Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu  
995 1000 1005

Gln Asn Asn His Arg Ser Val Leu Val Ile Pro Glu Trp Glu Ala Glu  
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Val Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg  
1025 1030 1035 1040

Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His  
1045 1050 1055

Glu Ile Glu Asp Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu  
1060 1065 1070

Glu Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asn Tyr Thr Gly  
1075 1080 1085

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Gln Gly Tyr  
1090 1095 1100

Asp Glu Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser  
105 1110 1115 1120

Val Tyr Glu Glu Lys Ser Tyr Thr Asp Gly Arg Arg Glu Asn Pro Cys  
1125 1130 1135

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr  
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Val Thr Lys Asp Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile  
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Leu Leu Met Glu Glu  
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aat cat tcc gca caa atg gat cta tta cca gat gct cgt att gag gat 96  
Asn His Ser Ala Gln Met Asp Leu Leu Pro Asp Ala Arg Ile Glu Asp  
20 25 30

agc ttg tgt ata gcc gag ggg aac aat att gat cca ttt gtt agc gca 144  
Ser Leu Cys Ile Ala Glu Gly Asn Asn Ile Asp Pro Phe Val Ser Ala  
35 40 45

tca aca gtc caa acg ggt att aac ata gct ggt aga ata cta ggc gta 192  
Ser Thr Val Gln Thr Gly Ile Asn Ile Ala Gly Arg Ile Leu Gly Val  
50 55 60

ttg ggc gta ccg ttt gct gga caa cta gct agt ttt tat agt ttt ctt 240  
Leu Gly Val Pro Phe Ala Gly Gln Leu Ala Ser Phe Tyr Ser Phe Leu  
65 70 75 80

gtt ggt gaa tta tgg ccc cgc ggc aga gat cag tgg gaa att ttc cta 288

Val Gly Glu Leu Trp Pro Arg Gly Arg Asp Gln Trp Glu Ile Phe Leu			
85	90	95	
gaa cat gtc gaa caa ctt ata aat caa caa ata aca gaa aat gct agg			336
Glu His Val Glu Gln Leu Ile Asn Gln Gln Ile Thr Glu Asn Ala Arg			
100	105	110	
aat acg gct ctt gct cga tta caa ggt tta gga gat tcc ttc aga gcc			384
Asn Thr Ala Leu Ala Arg Leu Gln Gly Leu Gly Asp Ser Phe Arg Ala			
115	120	125	
tat caa cag tca ctt gaa gat tgg cta gaa aac cgt gat gat gca aga			432
Tyr Gln Gln Ser Leu Glu Asp Trp Leu Glu Asn Arg Asp Asp Ala Arg			
130	135	140	
acg aga agt gtt ctt cat acc caa tat ata gct tta gaa ctt gat ttt			480
Thr Arg Ser Val Leu His Thr Gln Tyr Ile Ala Leu Glu Leu Asp Phe			
145	150	155	160
ctt aat gcg atg ccg ctt ttc gca att aga aac caa gaa gtt cca tta			528
Leu Asn Ala Met Pro Leu Phe Ala Ile Arg Asn Gln Glu Val Pro Leu			
165	170	175	
ttg atg gta tat gct caa gct gca aat tta cac cta tta tta ttg aga			576
Leu Met Val Tyr Ala Gln Ala Ala Asn Leu His Leu Leu Leu Arg			
180	185	190	
gat gcc tct ctt ttt ggt agt gaa ttt ggg ctt aca tcg cag gaa att			624
Asp Ala Ser Leu Phe Gly Ser Glu Phe Gly Leu Thr Ser Gln Glu Ile			
195	200	205	
caa cgc tat tat gag cgc caa gtg gaa cga acg aga gat tat tcc gac			672
Gln Arg Tyr Tyr Glu Arg Gln Val Glu Arg Thr Arg Asp Tyr Ser Asp			
210	215	220	
tat tgc gta gaa tgg tat aat aca ggt cta aat agc ttg aga ggg aca			720
Tyr Cys Val Glu Trp Tyr Asn Thr Gly Leu Asn Ser Leu Arg Gly Thr			
225	230	235	240
aat gcc gca agt tgg gta cgg tat aat caa ttc cgt aga gat cta acg			768
Asn Ala Ala Ser Trp Val Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr			
245	250	255	
tta gga gta tta gat cta gtg gca cta ttc cca agc tat gac act cgc			816
Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro Ser Tyr Asp Thr Arg			
260	265	270	
act tat cca ata aat acg agt gct cag tta aca aga gaa gtt tat aca			864
Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr Arg Glu Val Tyr Thr			
275	280	285	
gac gca att gga gca aca ggg gta aat atg gca agt atg aat tgg tat			912
Asp Ala Ile Gly Ala Thr Gly Val Asn Met Ala Ser Met Asn Trp Tyr			

290	295	300	
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agc ccg cat cta ctt gat ttt cta gaa caa ctt aca att ttt agc gct Ser Pro His Leu Leu Asp Phe Leu Glu Gln Leu Thr Ile Phe Ser Ala 325	330	335	1008
tca tca cga tgg agt aat act agg cat atg act tat tgg cgg ggg cac Ser Ser Arg Trp Ser Asn Thr Arg His Met Thr Tyr Trp Arg Gly His 340	345	350	1056
acg att caa tct cgg cca ata gga ggc gga tta aat acc tca acg cat Thr Ile Gln Ser Arg Pro Ile Gly Gly Leu Asn Thr Ser Thr His 355	360	365	1104
ggg gct acc aat act tct att aat cct gta aca tta cgg ttc gca tct Gly Ala Thr Asn Thr Ser Ile Asn Pro Val Thr Leu Arg Phe Ala Ser 370	375	380	1152
cga gac gtt tat agg act gaa tca tat gca gga gtg ctt cta tgg gga Arg Asp Val Tyr Arg Thr Glu Ser Tyr Ala Gly Val Leu Leu Trp Gly 385	390	395	1200
att tac ctt gaa cct att cat ggt gtc cct act gtt agg ttt aat ttt Ile Tyr Leu Glu Pro Ile His Gly Val Pro Thr Val Arg Phe Asn Phe 405	410	415	1248
acg aac cct cag aat att tct gat aga ggt acc gct aac tat agt caa Thr Asn Pro Gln Asn Ile Ser Asp Arg Gly Thr Ala Asn Tyr Ser Gln 420	425	430	1296
cct tat gag tca cct ggg ctt caa tta aaa gat tca gaa act gaa tta Pro Tyr Glu Ser Pro Gly Leu Gln Leu Lys Asp Ser Glu Thr Glu Leu 435	440	445	1344
cca cca gaa aca aca gaa cga cca aat tat gaa tct tac agt cac agg Pro Pro Glu Thr Thr Glu Arg Pro Asn Tyr Glu Ser Tyr Ser His Arg 450	455	460	1392
tta tct cat ata ggt ata att tta caa tcc agg gtg aat gta ccg gta Leu Ser His Ile Gly Ile Leu Gln Ser Arg Val Asn Val Pro Val 465	470	475	1440
tat tct tgg acg cat cgt agt gca gat cgt acg aat acg att gga cca Tyr Ser Trp Thr His Arg Ser Ala Asp Arg Thr Asn Thr Ile Gly Pro 485	490	495	1488
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aat ttt gtg aga cgt gct ttt act aca cct ttt act ttt aca caa att Asn Phe Val Arg Arg Ala Phe Thr Thr Pro Phe Thr Phe Thr Gln Ile 595 600 605	1824
caa gat ata att cga acg tct att caa ggc ctt agt gga aat ggg gaa Gln Asp Ile Ile Arg Thr Ser Ile Gln Gly Leu Ser Gly Asn Gly Glu 610 615 620	1872
gtg tat ata gat aaa att gaa att att cca gtt act gca acc ttc gaa Val Tyr Ile Asp Lys Ile Glu Ile Ile Pro Val Thr Ala Thr Phe Glu 625 630 635 640	1920
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att gat caa gta tcc aat tta gtg gcg tgt tta tcg gat gaa ttc tgc Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser Asp Glu Phe Cys 675 680 685	2064
ttg gat gaa aag aga gaa tta ctt gag aaa gtg aaa tat gcg aaa cga Leu Asp Glu Lys Arg Glu Leu Leu Glu Lys Val Lys Tyr Ala Lys Arg 690 695 700	2112
ctc agt gat gaa aga aac tta ctc caa gat cca aac ttc aca tcc atc Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn Phe Thr Ser Ile 705 710 715 720	2160
aat aag caa cca gac ttc ata tct act aat gag caa tcg aat ttc aca	2208

Asn Lys Gln Pro Asp Phe Ile Ser Thr Asn Glu Gln Ser Asn Phe Thr	725	730	735		
tct atc cat gaa caa tct gaa cat gga tgg tgg gga agt gag aac att Ser Ile His Glu Gln Ser Glu His Gly Trp Trp Gly Ser Glu Asn Ile	740	745	750	2256	
acc atc cag gaa gga aat gac gta ttt aaa gag aat tac gtc aca cta Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn Tyr Val Thr Leu	755	760	765	2304	
ccg ggt act ttt aat gag tgt tat ccg acg tat tta tat caa aaa ata Pro Gly Thr Phe Asn Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile	770	775	780	2352	
ggg gag tcg gaa tta aaa gct tat act cgc tac caa tta aga ggt tat Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr	785	790	795	800	2400
att gaa gat agt caa gat tta gag ata tat ttg att cgt tat aat gcg Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala	805	810	815	2448	
aaa cat gaa aca ttg gat gtt cca ggt acc gag tcc cta tgg ccg ctt Lys His Glu Thr Leu Asp Val Pro Gly Thr Glu Ser Leu Trp Pro Leu	820	825	830	2496	
tca gtt gaa agc cca atc gga agg tgc gga gaa ccg aat cga tgc gca Ser Val Glu Ser Pro Ile Gly Arg Cys Gly Glu Pro Asn Arg Cys Ala	835	840	845	2544	
cca cat ttt gaa tgg aat cct gat cta gat tgt tcc tgc aga gat gga Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly	850	855	860	2592	
gaa aaa tgt gcg cat cat tcc cat cat ttc tct ttg gat att gat gtt Glu Lys Cys Ala His His Ser His Phe Ser Leu Asp Ile Asp Val	865	870	875	880	2640
gga tgc aca gac ttg cat gag aat cta ggc gtg tgg gtg gta ttc aag Gly Cys Thr Asp Leu His Glu Asn Leu Gly Val Trp Val Val Phe Lys	885	890	895	2688	
att aag acg cag gaa ggt cat gca aga cta ggg aat ctg gaa ttt att Ile Lys Thr Gln Glu Gly His Ala Arg Leu Gly Asn Leu Glu Phe Ile	900	905	910	2736	
gaa gag aaa cca tta tta gga gaa gca ctg tct cgt gtg aag agg gca Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ser Arg Val Lys Arg Ala	915	920	925	2784	
gag aaa aaa tgg aga gac aaa cgt gaa aaa cta caa ttg gaa aca aaa Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Gln Leu Glu Thr Lys				2832	

930	935	940	
cga gta tat aca gag gca aaa gaa gct gtg gat gct tta ttc gta gat			2880
Arg Val	Tyr Thr Glu Ala Lys Glu Ala Val Asp Ala Leu Phe Val Asp		
945	950	955	960
tct caa tat gat aga tta caa gcg gat aca aac atc ggc atg att cat			2928
Ser Gln	Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Gly Met Ile His		
965	970	975	
gcg gca gat aaa ctt gtt cat cga att cga gag gcg tat ctt tca gaa			2976
Ala Ala	Asp Lys Leu Val His Arg Ile Arg Glu Ala Tyr Leu Ser Glu		
980	985	990	
tta cct gtt atc cca ggt gta aat gcg gaa att ttt gaa gaa tta gaa			3024
Leu Pro	Val Ile Pro Gly Val Asn Ala Glu Ile Phe Glu Glu Leu Glu		
995	1000	1005	
ggt cac att atc act gca atc tcc tta tac gat gcg aga aat gtc			3069
Gly His	Ile Ile Thr Ala Ile Ser Leu Tyr Asp Ala Arg Asn Val		
1010	1015	1020	
gtt aaa aat ggt gat ttt aat aat gga tta aca tgt tgg aat gta			3114
Val Lys	Asn Gly Asp Phe Asn Asn Gly Leu Thr Cys Trp Asn Val		
1025	1030	1035	
aaa ggg cat gta gat gta caa cag agc cat cat cgt tct gac ctt			3159
Lys Gly	His Val Asp Val Gln Gln Ser His His Arg Ser Asp Leu		
1040	1045	1050	
gtt atc cca gaa tgg gaa gca gaa gtg tca caa gca gtt cgc gtc			3204
Val Ile	Pro Glu Trp Glu Ala Glu Val Ser Gln Ala Val Arg Val		
1055	1060	1065	
tgt ccg ggg tgt ggc tat atc ctt cgt gtc aca gcg tac aaa gag			3249
Cys Pro	Gly Cys Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu		
1070	1075	1080	
gga tat gga gag ggc tgc gta acg atc cat gaa atc gag aac aat			3294
Gly Tyr	Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn		
1085	1090	1095	
aca gac gaa cta aaa ttt aaa aac cgt gaa gaa gag gaa gtg tat			3339
Thr Asp	Glu Leu Lys Phe Lys Asn Arg Glu Glu Glu Val Tyr		
1100	1105	1110	
cca acg gat aca gga acg tgt aat gat tat act gca cac caa ggt			3384
Pro Thr	Asp Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gly		
1115	1120	1125	
aca gct gga tgc gca gat gca tgt aat tcc cgt aat gct gga tat			3429
Thr Ala	Gly Cys Ala Asp Ala Cys Asn Ser Arg Asn Ala Gly Tyr		
1130	1135	1140	

85

90

95

Glu His Val Glu Gln Leu Ile Asn Gln Gln Ile Thr Glu Asn Ala Arg  
100 105 110

Asn Thr Ala Leu Ala Arg Leu Gln Gly Leu Gly Asp Ser Phe Arg Ala  
115 120 125

Tyr Gln Gln Ser Leu Glu Asp Trp Leu Glu Asn Arg Asp Asp Ala Arg  
130 135 140

Thr Arg Ser Val Leu His Thr Gln Tyr Ile Ala Leu Glu Leu Asp Phe  
145 150 155 160

Leu Asn Ala Met Pro Leu Phe Ala Ile Arg Asn Gln Glu Val Pro Leu  
165 170 175

Leu Met Val Tyr Ala Gln Ala Ala Asn Leu His Leu Leu Leu Leu Arg  
180 185 190

Asp Ala Ser Leu Phe Gly Ser Glu Phe Gly Leu Thr Ser Gln Glu Ile  
195 200 205

Gln Arg Tyr Tyr Glu Arg Gln Val Glu Arg Thr Arg Asp Tyr Ser Asp  
210 215 220

Tyr Cys Val Glu Trp Tyr Asn Thr Gly Leu Asn Ser Leu Arg Gly Thr  
225 230 235 240

Asn Ala Ala Ser Trp Val Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr  
245 250 255

Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro Ser Tyr Asp Thr Arg  
260 265 270

Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr Arg Glu Val Tyr Thr  
275 280 285

Asp Ala Ile Gly Ala Thr Gly Val Asn Met Ala Ser Met Asn Trp Tyr  
290 295 300

Asn Asn Asn Ala Pro Ser Phe Ser Ala Ile Glu Ala Ala Ala Ile Arg  
305 310 315 320

Ser Pro His Leu Leu Asp Phe Leu Glu Gln Leu Thr Ile Phe Ser Ala  
325 330 335

Ser Ser Arg Trp Ser Asn Thr Arg His Met Thr Tyr Trp Arg Gly His  
340 345 350

Thr Ile Gln Ser Arg Pro Ile Gly Gly Leu Asn Thr Ser Thr His  
355 360 365

Gly Ala Thr Asn Thr Ser Ile Asn Pro Val Thr Leu Arg Phe Ala Ser  
370 375 380

Arg Asp Val Tyr Arg Thr Glu Ser Tyr Ala Gly Val Leu Leu Trp Gly  
385 390 395 400

Ile Tyr Leu Glu Pro Ile His Gly Val Pro Thr Val Arg Phe Asn Phe  
405 410 415

Thr Asn Pro Gln Asn Ile Ser Asp Arg Gly Thr Ala Asn Tyr Ser Gln  
420 425 430

Pro Tyr Glu Ser Pro Gly Leu Gln Leu Lys Asp Ser Glu Thr Glu Leu  
435 440 445

Pro Pro Glu Thr Thr Glu Arg Pro Asn Tyr Glu Ser Tyr Ser His Arg  
450 455 460

Leu Ser His Ile Gly Ile Ile Leu Gln Ser Arg Val Asn Val Pro Val  
465 470 475 480

Tyr Ser Trp Thr His Arg Ser Ala Asp Arg Thr Asn Thr Ile Gly Pro  
485 490 495

Asn Arg Ile Thr Gln Ile Pro Met Val Lys Ala Ser Glu Leu Pro Gln  
500 505 510

Gly Thr Thr Val Val Arg Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu  
515 520 525

Arg Arg Thr Asn Thr Gly Gly Phe Gly Pro Ile Arg Val Thr Val Asn  
530 535 540

Gly Pro Leu Thr Gln Arg Tyr Arg Ile Gly Phe Arg Tyr Ala Ser Thr  
545 550 555 560

Val Asp Phe Asp Phe Phe Val Ser Arg Gly Gly Thr Thr Val Asn Asn  
565 570 575

Phe Arg Phe Leu Arg Thr Met Asn Ser Gly Asp Glu Leu Lys Tyr Gly  
580 585 590

Asn Phe Val Arg Arg Ala Phe Thr Thr Pro Phe Thr Phe Thr Gln Ile  
595 600 605

Gln Asp Ile Ile Arg Thr Ser Ile Gln Gly Leu Ser Gly Asn Gly Glu  
610 615 620

Val Tyr Ile Asp Lys Ile Glu Ile Ile Pro Val Thr Ala Thr Phe Glu  
625 630 635 640

Ala Glu Tyr Asp Leu Glu Arg Ala Gln Glu Ala Val Asn Ala Leu Phe  
645 650 655

Thr Asn Thr Asn Pro Arg Arg Leu Lys Thr Asp Val Thr Asp Tyr His  
660 665 670

Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser Asp Glu Phe Cys  
675 680 685

Leu Asp Glu Lys Arg Glu Leu Leu Glu Lys Val Lys Tyr Ala Lys Arg  
690 695 700

Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn Phe Thr Ser Ile  
705 710 715 720

Asn Lys Gln Pro Asp Phe Ile Ser Thr Asn Glu Gln Ser Asn Phe Thr

725

730

735

Ser Ile His Glu Gln Ser Glu His Gly Trp Trp Gly Ser Glu Asn Ile  
740 745 750

Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn Tyr Val Thr Leu  
755 760 765

Pro Gly Thr Phe Asn Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile  
770 775 780

Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr  
785 790 795 800

Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala  
805 810 815

Lys His Glu Thr Leu Asp Val Pro Gly Thr Glu Ser Leu Trp Pro Leu  
820 825 830

Ser Val Glu Ser Pro Ile Gly Arg Cys Gly Glu Pro Asn Arg Cys Ala  
835 840 845

Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly  
850 855 860

Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val  
865 870 875 880

Gly Cys Thr Asp Leu His Glu Asn Leu Gly Val Trp Val Val Phe Lys  
885 890 895

Ile Lys Thr Gln Glu Gly His Ala Arg Leu Gly Asn Leu Glu Phe Ile  
900 905 910

Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ser Arg Val Lys Arg Ala  
915 920 925

Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Gln Leu Glu Thr Lys  
930 935 940

Arg Val Tyr Thr Glu Ala Lys Glu Ala Val Asp Ala Leu Phe Val Asp  
945 950 955 960

Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Gly Met Ile His  
965 970 975

Ala Ala Asp Lys Leu Val His Arg Ile Arg Glu Ala Tyr Leu Ser Glu  
980 985 990

Leu Pro Val Ile Pro Gly Val Asn Ala Glu Ile Phe Glu Glu Leu Glu  
995 1000 1005

Gly His Ile Ile Thr Ala Ile Ser Leu Tyr Asp Ala Arg Asn Val  
1010 1015 1020

Val Lys Asn Gly Asp Phe Asn Asn Gly Leu Thr Cys Trp Asn Val  
1025 1030 1035

Lys Gly His Val Asp Val Gln Gln Ser His His Arg Ser Asp Leu  
1040 1045 1050

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Ala Val Arg Val  
1055 1060 1065

Cys Pro Gly Cys Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu  
1070 1075 1080

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn  
1085 1090 1095

Thr Asp Glu Leu Lys Phe Lys Asn Arg Glu Glu Glu Val Tyr  
1100 1105 1110

Pro Thr Asp Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gly  
1115 1120 1125

Thr Ala Gly Cys Ala Asp Ala Cys Asn Ser Arg Asn Ala Gly Tyr  
1130 1135 1140

Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn Tyr Lys  
1145 1150 1155

Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg Asp Asn  
1160 1165 1170

His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro Val Pro  
1175 1180 1185

Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp  
1190 1195 1200

Thr Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Lys Phe Ile Val  
1205 1210 1215

Asp Ser Val Glu Leu Leu Leu Met Glu Glu  
1220 1225